# Advanced TPS Materials

Completed Technology Project (2012 - 2018)

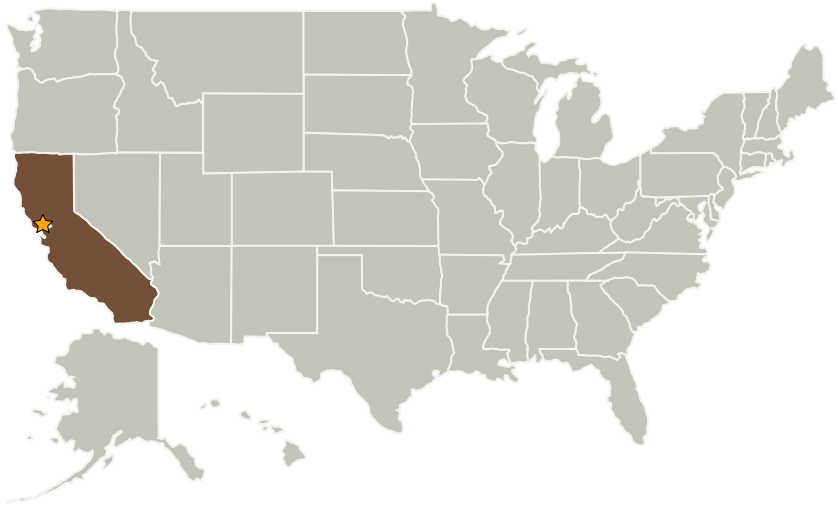
## Project Introduction

Via the exploration of alternate resins and substrate materials for ablative TPS, and the development of new high heat flux resistant flexible TPS systems, we intend to provide existing GCD investments "plug-and-play" options that will greatly increase the likelihood of mission infusion of these key technolgies.

## Anticipated Benefits

NASA funded: Flexible TPS investments will directly benefit the HIAD-2 project. NASA unfunded: Deliver new TPS concepts that will enable the use of Hypersonic Inflatable Aerodynamic Decelerators (HIADs) for exploration missions and greatly enhance operational range for conformal TPS systems. Alternate resin conformals, along with CA-250, form the basis for proposed new start work as well as an incentivized technology in the upcoming New Frontiers proposal call. OGA: Flexible TPS spinoff (CHIEFS) has potential application for fire fighter personal protection system which is being evaluated in partnership with the US Forestry Service. Commercial: The Commercial space industry has already expressed interest in both conformal TPS and HIAD technologies, and we are pursuing partnerships in conjunction with other STMD projects. Nation: Advances to high temperature materials has potential cross-cutting benefits in many areas. We are already pursuing a spinoff for personal fire shelters which could save the lives of front line forest fire fighters. Additional spinoffs are possible in other areas as well.

## Primary U.S. Work Locations and Key Partners

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## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Center / Facility:**

Ames Research Center (ARC)

**Responsible Program:**

Game Changing Development

**Game Changing Development**

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| Organizations Performing Work | Role | Type | Location |
|---|---|---|---|
| ★Ames Research Center(ARC) | Lead Organization | NASA Center | Moffett Field, California |

| Primary U.S. Work Locations |
|---|
| California |

## Project Transitions

**October 2012:** Project Start

**January 2018:** Closed out

**Closeout Summary:** This technology element represents the CHIEFS work done for the US Forestry Service. The initial design has been tested in a relevant environment is near TRL6. Plan for future funding in development are pending. The CHIEFS task within the Entry Systems Modeling Project was focused on the collaborative development of flexible insulator materials and fabrication concepts derived from flexible thermal protection heatshields for NASA inflatable vehicle technology and with potential benefit to the U.S. Forest Service (USFS) emergency fire shelter. The technology interests for both organizations have common functional needs that include short duration high temperature resistance, low mass, robust packing capability, one-time use, and low stowage volume. The CHIEFS project leveraged the experience and technical capabilities from both organizations which led to significant improvement in the protective capability of prototype shelters and ultimately enhances the survivability of entrapped firefighting personnel. Fire shelter technology has been transferred to the US Forest Service which has manufactured several field test articles placed in service during the Summer 2018 firefighting season. Results from post field-service tests will be conducted to determine these test articles will help to determine potential replacement of existing shelter designs.

## Project Website:

https://www.nasa.gov/directorates/spacetech/home/index.html

## Project Management

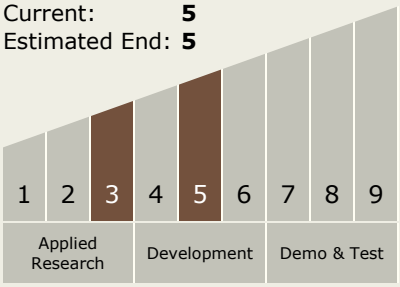
**Program Director:**
Mary J Werkheiser

**Program Manager:**
Gary F Meyering

**Principal Investigator:**
Michael J Wright

## Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**




## Target Destinations

Earth, Mars, Others Inside the Solar System